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IN THE CLAIMS

1-52 (canceled)

53. (currently amended) An ionic conducting membrane comprising:
a membrane having opposing surfaces and a thickness between said surfaces, said
membrane including a polymerization product of
one or more monomers selected from the group of water-soluble, ethylenically-
5 unsaturated acids and acid derivatives, said water soluble ethylenically unsaturated
acids and acid derivatives selected from the group consisting of 1-vinyl-2-
pyrrolidinone, the sodium salt of vinylsulfonic acid, and combinations comprising at
least one of the foregoing ethylenically unsaturated acids and derivatives; and
a crosslinking agent,
10 wherein a first solution is used for polymerizing the membrane to the thickness; and
wherein at least a portion of said first solution is species replaced with a second
solution characterized by an alkaline component.

54. (previously presented) The ionic conducting membrane as in claim 53, said
membrane further comprising a water-soluble or water-swellaable polymer.

55. (previously presented) The ionic conducting membrane as in claim 53, said membrane
further comprising a chemical polymerization initiator.

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56. (previously presented) The ionic conducting membrane as in claim 53, said membrane further comprising:

a water-soluble or water-swellaable polymer; and

a chemical polymerization initiator.

57. (previously presented) The ionic conducting membrane as in claim 53, said membrane further comprising a neutralizing agent.

58. (previously presented) The ionic conducting membrane as in claim 53, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 50%.

59. (previously presented) The ionic conducting membrane as in claim 53, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 20%.

60. (previously presented) The ionic conducting membrane as in claim 53, wherein water comprises about 60% to about 80%, on a weight basis, of the polymer matrix material.

61. (previously presented) The ionic conducting membrane as in claim 53, wherein water comprises about 62% to about 75%, on a weight basis, of the polymer matrix material.

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62. (canceled)

63. (canceled)

64. (canceled)

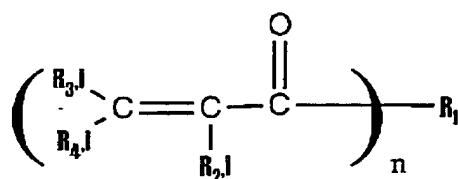
65. (previously presented) The ionic conducting membrane as in claim 53, wherein the ethylenically unsaturated acids or acid derivatives comprises about 5% to about 50%, by weight, of the total monomer solution prior to polymerization.

66. (previously presented) The ionic conducting membrane as in claim 53, wherein the ethylenically unsaturated acids or acid derivatives comprises about 7% to about 25%, by weight, of the total monomer solution prior to polymerization.

67. (previously presented) The ionic conducting membrane as in claim 53, wherein the ethylenically unsaturated acids or acid derivatives comprises about 10% to about 20%, by weight, of the total monomer solution prior to polymerization.

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68. (previously presented) The ionic conducting membrane as in claim 53, wherein the crosslinking agent is of the general formula:



5 wherein $i=1 \rightarrow n$, and $n \geq 2$;

$R_{2,i}$, $R_{3,i}$, and $R_{4,i}$ are independently selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, aromatics, halogens, carboxylic acid derivatives, sulfates and nitrates;

R_1 is selected from the group consisting of N, NR_5 , NH, O, and carboxylic-acid derivatives,

10 wherein R_5 is selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, and aromatics.

69. (previously presented) The ionic conducting membrane as in claim 53, wherein the crosslinking agent is selected from the group consisting of methylenebisacrylamide, ethylenebisacrylamide, any water-soluble N,N'-alkylidene-bis(ethylenically unsaturated amide), 1,3,5-Triacryloylhexahydro-1,3,5-triazine, and combinations comprising at least one
5 of the foregoing crosslinking agents.

70. (previously presented) The ionic conducting membrane as in claim 53, wherein the crosslinking agent comprises about 0.01% to about 15%, by weight, of the total monomer solution prior to polymerization.

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71. (previously presented) The ionic conducting membrane as in claim 53, wherein the crosslinking agent comprises about 0.5% to about 5%, by weight, of the total monomer solution prior to polymerization.

72. (previously presented) The ionic conducting membrane as in claim 53, wherein the crosslinking agent comprises about 1% to about 3%, by weight, of the total monomer solution prior to polymerization.

73. (currently amended) The ionic conducting membrane as in claim ~~45~~53, wherein the alkaline component comprises KOH.

74. (previously presented) The ionic conducting membrane as in claim 73, wherein the conductivity is greater than about 0.1 Siemens per centimeter.

75. (previously presented) The ionic conducting membrane as in claim 73, wherein the conductivity is greater than about 0.2 Siemens per centimeter.

76. (previously presented) The ionic conducting membrane as in claim 73, wherein the conductivity is greater than about 0.4 Siemens per centimeter.

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77. (currently amended) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellaible polymer is selected from the group consisting of polysulfone (anionic), poly(sodium-4-styrenesulfonate), carboxymethyl cellulose, polysulfone (anionic), sodium salt of poly(styrenesulfonic acid-co-maleic acid), corn starch, any other
- 5 water-soluble or water-swellaible polymers, and combinations comprising at least one of the foregoing polymers.

78. (previously presented) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellaible polymer comprises less than about 30%, by weight, of the membrane.

79. (previously presented) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellaible polymer comprises about 1% to about 10%, by weight, of the membrane.

80. (previously presented) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellaible polymer comprises about 1% to about 4%, by weight, of the membrane.

81. (currently amended) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellaible polymer is selected from the group consisting of polysulfone (anionic), poly(sodium-4-styrenesulfonate), carboxymethyl cellulose, polysulfone (anionic), sodium salt of poly(styrenesulfonic acid-co-maleic acid), corn starch, any other

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- 5 water-soluble or water-swellaable polymers, and combinations comprising at least one of the foregoing polymers.

82. (previously presented) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellaable polymer comprises less than about 30%, by weight, of the membrane.

83. (previously presented) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellaable polymer comprises about 1% to about 10%, by weight, of the membrane.

84. (previously presented) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellaable polymer comprises about 1% to about 4%, by weight, of the membrane.

85. (previously presented) The ionic conducting membrane as in claim 55, wherein the chemical polymerization initiator is selected from the group consisting of ammonium persulfate, alkali metal persulfates and peroxides, and combinations comprising at least one of the foregoing initiators.

86. (previously presented) The ionic conducting membrane as in claim 55, wherein the chemical polymerization initiator comprises less than about 3%, by weight, of the membrane.

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87. (previously presented) The ionic conducting membrane as in claim 56, wherein the chemical polymerization initiator is selected from the group consisting of ammonium persulfate, alkali metal persulfates and peroxides, and combinations comprising at least one of the foregoing initiators.

88. (previously presented) The ionic conducting membrane as in claim 56, wherein the chemical polymerization initiator comprises less than about 3%, by weight, of the membrane.

89. (previously presented) The ionic conducting membrane as in claim 53, further comprising a substrate.

90. (previously presented) The ionic conducting membrane as in claim 89, wherein the substrate comprises polyolefin, polyvinyl alcohol, cellulose, or polyamide.

91. (previously presented) The ionic conducting membrane as in claim 53, wherein said membrane is polymerized in situ on an electrode.

92- 104. (Canceled)

105. (New) The ionic conducting membrane as in claim 53, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 5%.

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106. (New) The ionic conducting membrane as in claim 53, wherein water comprises about 50% to about 90%, on a weight basis, of the membrane.

107. (New) An ionic conducting membrane comprising:

a membrane having opposing surfaces and a thickness between said surfaces, said membrane including a polymerization product of

one or more monomers selected from the group of water-soluble, ethylenically-

5 unsaturated acids and acid derivatives;

a water-soluble or water-swellaable polymer selected from the group consisting of polysulfone (anionic), poly(sodium-4-styrenesulfonate), carboxymethyl cellulose, sodium salt of poly(styrenesulfonic acid-co-maleic acid), corn starch, any other water-soluble or water-swellaable polymers, and combinations comprising at least one of the
10 foregoing polymers; and

a crosslinking agent,

wherein a first solution is used for polymerizing the membrane to the thickness; and

wherein at least a portion of said first solution is species replaced with a second solution characterized by an alkaline component.

108. (New) The ionic conducting membrane as in claim 107, said membrane further comprising a chemical polymerization initiator.

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109. (New) The ionic conducting membrane as in claim 107, said membrane further comprising a neutralizing agent.

110. (New) The ionic conducting membrane as in claim 107, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 50%.

111. (New) The ionic conducting membrane as in claim 107, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 20%.

112. (New) The ionic conducting membrane as in claim 107, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 5%.

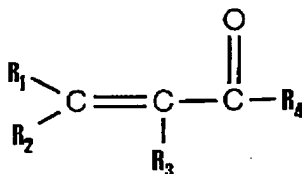
113. (New) The ionic conducting membrane as in claim 107, wherein water comprises about 50% to about 90%, on a weight basis, of the membrane.

114. (New) The ionic conducting membrane as in claim 107, wherein water comprises about 60% to about 80%, on a weight basis, of the polymer matrix material.

115. (New) The ionic conducting membrane as in claim 107, wherein water comprises about 62% to about 75%, on a weight basis, of the polymer matrix material.

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116. (New) The ionic conducting membrane as in claim 107, wherein the water soluble ethylenically unsaturated acids and acid derivatives have the general formula:



wherein R1, R2, and R3 are independently selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, aromatics, halogens, carboxylic acid derivatives, sulfates and nitrates; and

R4 is selected from the group consisting of NR5, NHR5, NH2, OH, H, halides, OR5, and carboxylic acid derivatives, wherein R5 is selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, and aromatics.

117. (New) The ionic conducting membrane as in claim 107, wherein the water soluble ethylenically unsaturated acids and acid derivatives are selected from the group consisting of methylenebisacrylamide, acrylamide, methacrylic acid, acrylic acid, fumaramide, fumaric acid, N-isopropylacrylamide, N, N-dimethylacrylamide, 3,3-dimethylacrylic acid, maleic anhydride, and combinations comprising at least one of the foregoing ethylenically unsaturated acids and derivatives.

118. (New) The ionic conducting membrane as in claim 107, wherein the water soluble ethylenically unsaturated acids and acid derivatives are selected from the group consisting of 1-vinyl-2-pyrrolidinone, the sodium salt of vinylsulfonic acid, and combinations comprising at least one of the foregoing ethylenically unsaturated acids and derivatives.

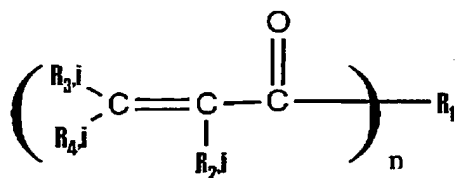
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119. (New) The ionic conducting membrane as in claim 107, wherein the ethylenically unsaturated acids or acid derivatives comprises about 5% to about 50%, by weight, of the total monomer solution prior to polymerization.

120. (New) The ionic conducting membrane as in claim 107, wherein the ethylenically unsaturated acids or acid derivatives comprises about 7% to about 25%, by weight, of the total monomer solution prior to polymerization.

121. (New) The ionic conducting membrane as in claim 107, wherein the ethylenically unsaturated acids or acid derivatives comprises about 10% to about 20%, by weight, of the total monomer solution prior to polymerization.

122. (New) The ionic conducting membrane as in claim 107, wherein the crosslinking agent is of the general formula:



5 wherein $i=1 \rightarrow n$, and $n \geq 2$;

$R_{2,i}$, $R_{3,i}$, and $R_{4,i}$ are independently selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, aromatics, halogens, carboxylic acid derivatives, sulfates and nitrates;

R_1 is selected from the group consisting of N, NR_5 , NH, O, and carboxylic-acid derivatives,

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- 10 wherein R5 is selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, and aromatics.

123. (New) The ionic conducting membrane as in claim 107, wherein the crosslinking agent is selected from the group consisting of methylenebisacrylamide, ethylenebisacrylamide, any water-soluble N,N'-alkylidene-bis(ethylenically unsaturated amide), 1,3,5-Triacryloylhexahydro-1,3,5-triazine, and combinations comprising at least one
5 of the foregoing crosslinking agents.

124. (New) The ionic conducting membrane as in claim 107, wherein the crosslinking agent comprises about 0.01% to about 15%, by weight, of the total monomer solution prior to polymerization.

125. (New) The ionic conducting membrane as in claim 107, wherein the crosslinking agent comprises about 0.5% to about 5%, by weight, of the total monomer solution prior to polymerization.

126. (New) The ionic conducting membrane as in claim 107, wherein the crosslinking agent comprises about 1% to about 3%, by weight, of the total monomer solution prior to polymerization.

127. (New) The ionic conducting membrane as in claim 107, wherein the alkaline component comprises KOH.

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128. (New) The ionic conducting membrane as in claim 127, wherein the conductivity is greater than about 0.1 Siemens per centimeter.

129. (New) The ionic conducting membrane as in claim 127, wherein the conductivity is greater than about 0.2 Siemens per centimeter.

130. (New) The ionic conducting membrane as in claim 127, wherein the conductivity is greater than about 0.4 Siemens per centimeter.

131. (New) The ionic conducting membrane as in claim 107, wherein the water-soluble or water-swellaable polymer comprises less than about 30%, by weight, of the membrane.

132. (New) The ionic conducting membrane as in claim 107, wherein the water-soluble or water-swellaable polymer comprises about 1% to about 10%, by weight, of the membrane.

133. (New) The ionic conducting membrane as in claim 107, wherein the water-soluble or water-swellaable polymer comprises about 1% to about 4%, by weight, of the membrane.

134. (New) The ionic conducting membrane as in claim 108, wherein the chemical polymerization initiator is selected from the group consisting of ammonium persulfate, alkali metal persulfates and peroxides, and combinations comprising at least one of the foregoing initiators.

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135. (New) The ionic conducting membrane as in claim 108, wherein the chemical polymerization initiator comprises less than about 3%, by weight, of the membrane.

136. (New) The ionic conducting membrane as in claim 107, further comprising a substrate.

137. (New) The ionic conducting membrane as in claim 136, wherein the substrate comprises polyolefin, polyvinyl alcohol, cellulose, or polyamide.

138. (New) The ionic conducting membrane as in claim 107, wherein said membrane is polymerized in situ on an electrode.